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ABSTRACT

When a school community is making a major investment in technology, the major challenge is to ensure that the technologies are used to support innovative practices that are responsive to the community's changing needs and opportunities for teaching and learning. How can implementation of technology be integrally embedded in and supportive of innovation and reform? How can a local school community build its own capacity for innovation while at the same time staying in synchrony with top-down and system-wide initiatives? How much innovation can a school adequately support at any one time? Can these locally initiated innovations become institutionalized? Can the local community be a research testbed to feed back information to the larger system? These questions are being addressed in the pre-K-12 school community of a United States military base overseas, which is part of the United States Department of Defense Education Activity (DoDEA) worldwide school systems. Vanguard for Learning is a 30-month research project sponsored by the DoDEA and funded by the National Science Foundation to investigate these questions about technology and educational reform. This paper provides an overview of the Vanguard model for innovation and some key findings to date. (Author)

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Paper Session

Building Capacity for Innovation: The Vanguard for Learning Model

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Abstract

When a school community is making a major investment in technology, the major challenge is to ensure that the technologies are used to support innovative practices that are responsive to the community's changing needs and opportunities for teaching and learning. How can implementation of technology be integrally embedded in and supportive of innovation and reform? How can a local school community build its own capacity for innovation while at the same time staying in synchrony with top-down and system-wide initiatives? How much innovation can a school adequately support at any one time? Can these locally initiated innovations become institutionalized? Can the local community be a research testbed to feed back information to the larger system? These questions are being addressed in the pre-K–12 school community of a U.S. military base overseas, which is part of the U.S. Department of Defense Education Activity (DoDEA) worldwide school system. Vanguard for Learning is a 30-month research project sponsored by the DoDEA and funded by the National Science Foundation to investigate these questions about technology and educational reform. This paper provides an overview of the Vanguard model for innovation and some key findings to date. More information and research findings can be found at http://copernicus.bbn.com/vanguard/.

The Vanguard Model for Innovation

The goals of Vanguard for Learning are to:

- learn how to build a school community's capacity to initiate, evaluate, and institutionalize new ways of learning and teaching
- use innovation efforts in that school community to investigate selected key components of reform that can inform DoDEA system-wide practices
- use lessons learned from Aviano and DoDEA to advance

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understanding of systemic reform processes in education generally

The Vanguard for Learning project, as a model for educational innovation, includes seven key components. These components include the following:

- local community planning
- high-leverage strategies derived from both system goals and local opportunities
- capacity-building goals and indicators of change towards them
- capacity-building teams across the community
- Team Action Plans (TAPs)
- external facilitation
- research agenda

The core ideas behind the Vanguard model are that (a) innovation needs to be grounded in the interests, abilities, needs, resources, and constraints of a particular local community while at the same time staying in synchrony with and helping to inform initiatives from the larger school system of which the local community is a part; and (b) an infusion of computer and communications technologies into the schools may be a catalyst for but should not be the central focus of educational innovation. Professional development is embedded in all components.

1. Local Community Planning

The planning process engages a wide range of stakeholders across an entire local school community, which includes all of the pre-K–12 schools serving the families of a military base. Over a six-month period from November 1995 to April 1996, teachers and administrators, students, parents, and military personnel at Aviano Air Base considered what it means to them to serve as a Model School for DoDEA, in the context of their own plans, priorities, and resources. This planning included the following processes:

- begin creating a culture in which reflection and innovation are valued and expected of everyone. To stimulate this process, teachers, parents, administrators, and military proposed many promising ideas for innovative practices and projects.
- begin creating and articulating a shared vision of reform, which is a central component of organizational capacity. (O'Day et al., 1995; Means & Olson, 1995, p. 165). The Linking for Learning strategies described below are a beginning step in the development of a shared vision.

• introduce a process for initiating, planning, implementing, and evaluating classroom level innovations and projects in support of the school-wide change priorities. The TAP described below was introduced and all teachers and administrators were invited to participate.

• develop and refine an understanding of both local and systemic conditions required for such change processes to take place, including leadership and human and technical infrastructure

2. Constructing High-Leverage Strategies

Overall strategies help ensure that out of an infinite number of possibilities for changed practices, the community focuses on certain themes having the greatest likelihood of making a difference for a large proportion of learners. These themes helped to foster the continued building of a common vision across the community. The Aviano Vanguard high-leverage strategies were built on an analysis and integration of the following:

• priorities of the DoDEA leadership and Strategic Plan. At the system-wide level, the DoDEA Strategic Plan (DoDEA, 1995) identifies goals, such as raising test scores, building relations between the community and the schools, and closing the gap between majority and minority students, that provide the direction for major reform of the entire system to meet demands of changing society. A growing reform literature (e.g., Fullan, 1993, 1996; McLauglin, 1992; Tyack & Cuban, 1995) is documenting the fact that successful reform must involve all levels of the system coming together in consensus about what reforms they want to pursue. That process involves teachers, administrators, parents, and students from the school communities, and administrators and curriculum specialists from the district and central offices in joint decision making to develop clear understandings about roles and expectations. DoDEA leadership has instituted a number of processes aimed toward engaging all members of the schools' communities in these reform processes. These include, for example, the School Improvement Process (SIP), professional development strategies, site-based management, Program Quality Review processes, performance standards in all subjects, and technological infrastructure that will enable better communications and information management.

• interests, special capabilities, and priorities expressed by people in the Aviano school community and Air Force Base and the Italy District Superintendent's Office. This school community has experienced a high level of stress over the

past several years because of the build-up of the Aviano Air Base, very restricted physical space and facilities, and growth of the school population, in addition to the more typical pressures of implementing new curriculum standards, a new system-wide School Improvement Process, and other systemic changes.

• knowledge derived from research and effective practice in learning, teaching, and school reform; (e.g., Hodges, 1994; Mehlinger, 1996)

• opportunities offered by modern technologies to strengthen and leverage the resources and innovations. Over the past three years these schools have received substantial equipment and network resources from several different sources.

Aviano Vanguard Strategies: Linking for Learning

By strengthening and creating linkages among people and content across the curriculum, among the families and military commands in a school community, and among DoDEA schools, people at all levels are able to take on new roles as leaders of innovation and supporters of each others' learning and development. Linking for Learning goes beyond making incremental improvements in existing practice. It leverages human, informational, and technological resources across three levels of innovation.

Linking Across the Curriculum: Increasingly educational reformers argue that all students should have the opportunity to practice and apply skills and knowledge within the context of tasks that are personally meaningful and challenging (Collins, Brown, & Newman, 1989; Resnick, 1987; Means, 1995). The DoDEA Community Strategic Plan recognizes that "We are expected to impart more complex knowledge, cover additional content, and foster the application of information to solve present and future problems … our curriculum must become more integrated … integration of content across curriculum domains, clear connections with the world outside of school, diversity … and associated instructional practices (e.g., teamwork, active student participation in learning …." However, the reality is that the curriculum is separated into subject areas, and there are required textbooks across the system. Hence, linking across the curriculum is very challenging at this time.

Linking Across the Community: Research confirms that regardless of the economic, racial, or cultural background of the family, when parents are partners in their children's education, the results are improved student achievement, better school attendance, reduced dropout rates, and decreased delinquency (e.g., McCaleb, 1994; Snodgrass, 1991; Illinois, 1993). The DoDEA Community Strategic Plan emphasizes the importance of parental participation: "For our students to receive the maximum possible benefit from their educational experiences, parents must be full partners in their children's education. To accomplish this goal, we must enhance our programs of school-home communication, parent involvement in school activities, parent involvement in student learning activities, and we must increase parent involvement in the decision-making process about their children's education."

(DoDEA, 1995)

DoDDS schools have special opportunities and resources for learning because of their special relationship with a military base and the skills and knowledge of its personnel. The relationship between the military commands, families, and schools in Aviano Air Base has offered extraordinary opportunities to advance learning. For instance, the commander of the air base, General Wald, initiated a mentorship program, established a paid civilian position to administer it, and encouraged group commands to allow personnel two hours per week of duty time to serve as mentors to school children.

Linking Across DoDEA: Linking across DoDEA schools is one strategy for sharing expertise and resources. Due to the global distribution of DoDEA there exist both special problems (e.g. logistics) and special opportunities (e.g. researching and sharing Host Nation cultural resources). As the DoDEA worldwide system implements technology—particularly Internet connectivity—over the next several years, the "virtual" classroom will offer more opportunities. Vanguard for Learning is testing ways of linking among schools through such activities cross-age tutoring, teacher collaborations, and networked projects.

3. Create and Monitor Capacity-Building Goals

As part of the planning process, Vanguard for Learning established 25 goals for building the capacity of the Aviano schools community to become a testbed for innovation for DoDEA, and ideas for how to achieve each of them. These goals were derived from prior research on effective school change and tailored to meet local conditions and opportunities. (Collins et al., 1994; Corcoran, 1995; Cradler, 1992; Dwyer et al., 1991; Goldberg & Richards, 1995; Griffin, 1982; Hodges, 1994; Hunter & Goldberg, 1995; Hunter, 1993, 1995; Hurst, 1994; Little, 1993; McLaughlin, 1993; Means & Olson, 1995; Means et al., 1995; Mehlinger, 1996; O'Day et al., 1995; Sheingold, 1991; Watts & Castle, 1993). These goals, in Aviano and the Italy District, included the following:

- shared vision across community
- culture of reflection, innovation
- process for initiating and planning projects
- adequate technology access for teachers
- capability to locate, explore, evaluate resources
- teacher access to expertise, knowledge
- collaborative teams among faculty
- teacher capacity for managing student-centered, project-based, inquiry learning
- teacher fluency in using appropriate technology tools

- teacher capacity to administer, score, and interpret multiple ways of assessing student outcomes
- teacher/staff ability to design action research studies
- reward structure for innovation
- teacher time for innovation, planning, collaborating, learning, and reflecting
- adequate technology access for students
- student capacity to provide tech support for teachers, students, users, and tech infrastructure
- technical support
- local decision-making process for resource allocation
- technical and administrative mechanisms for parent-school involvement and communications
- parent and base volunteers involved in curriculum content
- capability to link DoDEA Curriculum Standards and Aviano to innovative projects and resources
- coordination with other special projects, such as DARPA CAETI, President's 5-C's Technology Initiative; DoDEA Technology Planning
- cross-school student collaborations
- sharing innovations across DoDDS schools
- communications with District Superintendent's Office and DoDEA Headquarters staff

4. Forming and Nurturing Capacity-Building Teams

Existing organizational structures do not always have as their mission the kinds of capacity-building called for in the goals discussed above. In Aviano, four separate schools serve the families of the Aviano Air Base community. The organizational and geographic separation of these schools poses a challenge to community-wide collaboration. To build capacity across all the schools, we tried forming four new teams. These teams are the following:

Resource Advisory Team (RAT): This policy group includes the principals and assistant principals of all four schools, a School Improvement Leadership Team (SILT) representative from each school, and a Union representative. The RAT

addresses issues of technology infrastructure, policy, and innovation priorities across the four schools. The greatest challenge to building a strong local management team has been the turnover in leadership. Four of the seven principals and assistant principals now on the RAT were not involved in the initial planning for Vanguard, and three of the original leaders are no longer in Aviano. Similarly, all of the SILT leaders have changed, as has the Union representative.

Student Enablement Action Team (SEAT): The SEAT is a for-credit course for students in Grades 7–12, providing them with skills in teaching and in technology. The SEAT is building a key resource to the teachers and other students across the school community.

Assessment Team: The AT is composed of two teachers or administrators from each of the schools, plus a staff person from the District Superintendent's Office. The AT is learning how to design and conduct assessments of student learning. The goal is for the AT to provide consulting services to the SIP and to the TAPs.

School/Home/Community Team: The S/H/C team is composed of parents, military personnel, teachers, administrators, and others who are building the community's capacity to foster stronger academic linkages between the school, the home, and the military. This team was extremely effective and creative during the 1996–97 school year, but nearly all of the organizers and participants had a Permanent Change of Station in the summer of 1997, and the team had to rebuild in the fall. One of the most promising innovations this team created is a physical location for each school called a School/Home/Community Resource Center where parents can go to learn about the schools, curriculum, and technologies.

5. Team Action Plans

TAPs are the core action component of the Vanguard model. The SIP provides an opportunity for schools to develop and implement school-wide changes in response to high-priority DoDEA benchmark goals. The Vanguard model extends the SIP by encouraging teachers to collaboratively construct, implement, and evaluate projects that support SIP benchmarks, and offering new opportunities and approaches to teaching, learning, and professional development. The process for accomplishing this is called TAP. In the Vanguard model, the TAPs drive innovation and requirements for professional development, and provide the context for research on systemic factors.

Small, voluntary teams are formed by teachers and others, to develop, implement, and evaluate projects that range from building new technical skills and teaching strategies to a full-scale action research project. The TAP process is built on research and experience from the California Model Technology Schools, other projects, and the action research tradition. (e.g., Cooley & Cradler, 1994; Noffke & Stevenson, 1995; Watt, 1995).

Fourteen TAP teams involving about 50 teachers, administrators, staff, and varying numbers of parents and students, formed in Aviano between January 1996 and August 1997. Table I summarizes key characteristics of these TAPs.

The Innovation Brief "Teachers in the Vanguard for Learning, Year 1" summarizes

lessons learned during the 1996–97 school year about what makes effective TAP teams. In 1997–98, our focus is on institutionalizing the TAPs through the official SIP, so that existing teams are contributing to the assessment of student learning and sharing their innovative practices with other teachers, while new TAP teams can continue to form and be supported. A continuing challenge to the schools and the district office is in deciding how much innovation can be adequately supported with existing resources.

6. External Facilitation

The sixth major component of the Vanguard model is the interaction of teachers and others in a school community with experts outside of the DoDEA system. The need for external facilitation has been recognized in other research on systemic reform but is particularly important in DoDDS where teachers are more isolated than in the U.S. Vanguard is testing a wide range of mechanisms for achieving that external facilitation, including on-site workshops, individual consultations, for-credit online courses, and network-based communications. As is the case in all schools, the most challenging factor in this effort is in finding time for teachers to devote to learning and exchanging information (Watts & Castle, 1993).

Table 1. Key Characteristics of Aviano TAPs

TAP	Subjects	Grades	SIP Benchmark*	Technology Applications	Vanguard Strategies Linking Across:
School/Home/ Community**	All	All	8.1	Database; e-mail; Internet	communit
Multimedia Productions	All, tech ed	9–12	10.8	Multimedia; video cameras	curriculum
Problem solving with GIS	All, tech ed	7–12	4.2; 8.1; 10.8	Geographic Info Sys; CAD	curriculum communit
One-Room Biology	Botany	6, 10	4.2; 10.8	E-mail; microscopes	curriculum cross-age
Writing Conference Partners	Writing	5, 7	3.1; 10.8	E-mail; World Wide Web	curriculum cross-age; DoDEA sc
Microcomputer-based Labs	Science	5–11	4.2; 10.8	MBL; e-mail	curriculum cross-age; DoDEA S
Radon	All, chem.	7–12	4.2; 8.1; 10.8	MBL; spreadsheets; GIS; radon detectors; World Wide Web	curriculum communit DoDEA sc
H S Electronic Portfolio	All	7–12	3.1; 10.8	World Wide Web; multimedia	curriculum
Presenting Yourself	All	4–6	3.1; 8.1; 10.8	Hypermedia; presentation tools	curriculum
Career Interests Elementary	All	3–6	4.2; 8.1; 10.8		curriculum communit
Elementary School Web Pages	All	3	3.1;8.1; 10.8	World Wide Web; digital cameras	curriculum communit
Project Based Learning Elementary	All	3–4	3.1; 4.2; 8.1; 10.8	Desktop publishing; video cameras and VCR; net projects	curriculum communit DoDEA sc
Text to Voice	All	All	3.1; 4.2; 10.8	Text to speech	curriculum
Student Authors	Writing, reading	pre-K–1	3.1; 8.1; 10.8	Desktop publishing	communit

*Benchmarks: 3.1 Increase student learning in reading, language arts, and social studies; 4.2 Narrow the racial,

ethnic, and gender gap in math and science; 8.1 Implement and evaluate the effects of home-school partnership; 10.8 Establish use of electronic technology for instruction, resource management, and record keeping.

**The School/Home/Community team started as a TAP and was changed to a Capacity-Building Team.

7. Research Agenda

The seventh major component of the Vanguard model for innovation is the creation of an agenda for research on factors that affect the school system's ability to change in response to changing demands of a changing world. The work of the capacity-building teams and TAPs serves as a context for studying six key components of systemic educational reform. The six areas of the Vanguard research agenda include the following:

1. **Student roles.** Under what conditions do students play new and expanded roles, and what are the benefits to the students? Increasingly, teachers are finding ways to enable students to be teachers of other students, both within their own classrooms and in cross-age settings.

2. **Assessing student learning.** What methods and measures of student learning are feasible and useful for teachers and others to employ when evaluating innovative practices, and what support do teachers need in order to do this? This is the most challenging issue the schools face as they attempt diverse innovations, and some of the TAP teachers have made great progress in the past two years.

3. **Professional development**. What methods for job-embedded professional development help build the capacities of teachers for implementing new models of learning and what are the relative costs of those methods? Out of a dozen different approaches tested in Vanguard, the TAP process is by far the most powerful because it builds synergy among the people who work together daily. Other approaches to meeting individual needs through external resources in a timely way have been found to be challenging and costly.

4. **Technology integration.** What factors contribute to achieving student, teacher, and parent access to equipment, networks, and digital resources needed for effective educational activities? In DoDDS, schools do not have local technology plans or local control over acquisition of staff and equipment resources. Local authority over technology acquisition and management, in relation to priorities of the local SIP, are essential if technology is to be integrated effectively into education.

5. **School-home-base relationships.** Under what conditions do parents and other base personnel play

significant new roles in helping students learn? In the three elementary schools, teachers have created many opportunities for parents to play key roles in the instructional process. Parents are essential to the innovative practices in these classrooms, and they participate enthusiastically because of opportunities they have for experiencing the products of their children's work.

6. **Institutionalizing innovation processes**. What factors affect the school community's ability to initiate, implement, evaluate, and sustain worthwhile innovations? Turnover in administration, base personnel, and families poses great challenges to sustaining efforts that are initiated. Hence institutionalization through the SIP and sustained support for teacher teams is critical to making cumulative progress. Ability of teachers to assess student outcomes from their innovative work, and communicate those findings to other members of the community, is essential to obtaining the political support needed to sustain innovative efforts.

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